Asian Journal of Epidemiology

ISSN 1992-1462

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OPEN ACCESS Asian Journal of Epidemiology

ISSN 1992-1462
DOI: 10.3923/aje.2017.76.82

Research Article
Trends in HIV/AIDS Epidemics in Merauke-Papua, Indonesia, from 1992-2017

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Abstract

Background and Objective: The pattern and severity of HIV/AIDS cases in Indonesia and Merauke Regency of Papua Province are on the increase. There is a limited study on the epidemiologic analysis of HIV/AIDS cases in Merauke Regency. This study aimed to identify trends in HIV/AIDS epidemics in Merauke Regency. **Materials and Methods:** Data were obtained from Info AIDS from 1992-January, 2017 under Disease Control and Environmental Health of Merauke Regency. The univariate, correlation and polynomial regression models and SPSS 19 were used as statistical tools for analyzing data. **Results:** During the study, 1,063 people tested positive for HIV in Merauke Regency, 902 people had AIDS and 537 died due to AIDS-related causes. The association between reported HIV infection cases and AIDS-related deaths yielded a Pearson correlation of 0.8053 ($p<0.0001$), however, there was no correlation between reported cases (HIV infection cases and AIDS cases and between AIDS cases and AIDS-related deaths). The values of a variation curve of the 5th-degree polynomials were 40.86, 60.17 and 58.90% for reported HIV infection cases, AIDS cases and AIDS-related deaths, respectively. **Conclusion:** It was concluded that data obtained in this study can be used as a basis for making policies and programs to reduce the spread of HIV and AIDS.

Key words: Fifth-degree polynomial, HIV/AIDS epidemic, Merauke, Pearson correlation, prevalence

Received: January 13, 2017 Accepted: February 17, 2017 Published: March 15, 2017

Citation: Titus Tambaip, Marni Br Karo, Mochammad Hatta, Rosdiana Natzir and Andi Asadul Islam, 2017. Trends in HIV/AIDS epidemics in merauke-papua, indonesia, from 1992-2017. Asian J. Epidemiol., 10: 76-82.

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Competing Interest: The authors have declared that no competing interest exists.

Data Availability: All relevant data are within the paper and its supporting information files.

INTRODUCTION

According to the 1st report of 1987, HIV/AIDS has devastated public health in Indonesia[1]. The number of people living with HIV infection in Indonesia by the end of 2015 was 690,000[2]. Furthermore, the number of new HIV infection cases in Indonesia was 73,000 by the end of December, 2015[2]. The prevalence of HIV infection and AIDS varies according to the province among Voluntary Counselling and Testing (VCT) clients, cumulative AIDS cases and some VCT sites. The Indonesian regions with the highest numbers of cumulative AIDS cases in 2010 were Jakarta (3,995), West Java (3,728), East Java (3,771) and Papua (3,665)[3]. Recently, 407 districts or cities reported HIV infection and AIDS cases in Indonesia[4]. The report of Directorate General of Communicable Disease Control and Environmental Health from Ministry of the Health Republic of Indonesia showed that the cumulative number of HIV infection and AIDS cases in Papua in 2014 were 16,051 and 10,184, respectively[5]. These data, compared with 2010, revealed that incidence of HIV infection and AIDS is increasing and the number of cumulative HIV infection and AIDS cases in Papua was higher than West Java in 2014[5].

Merauke is a regency in Papua Province, Indonesia, with a significant prevalence of HIV infection and AIDS. In March, 2016, a Papua Health Office report showed that Merauke regency has the highest number of cumulative HIV infection and AIDS cases (1,807) after Jayapura Regency (1,813), Jayapura City (3,762), Nabire Regency (4,162), Mimika Regency (4,162) and Jaya Wijaya Regency (5,293)[6]. Epidemiologic analysis in Merauke Regency is still limited. This study aimed to identify the trends in HIV infection and AIDS epidemic in Merauke Regency. The findings will be useful to develop effective policies and programs with tailored public health goals and planning that can positively affect treatment and prevention services for people living with HIV or AIDS.

MATERIALS AND METHODS

This study used the reported data for HIV infection, AIDS and AIDS-related death cases from the Info AIDS from 1992-January, 2017 under Disease Control and Environmental Health of Merauke Regency (Table 1)[7]. The distribution of reported HIV infection and AIDS cases and AIDS-related death cases has not been examined in Merauke Regency over the years. The data were assessed using univariate analysis to accomplish the description of the variables and their attributes, Pearson's correlation to discover whether there were any relationships among the variables and polynomial regression analysis to model the trend of HIV infection, AIDS and AID-related deaths reported from the 1992-January, 2017.

Table 1: Distribution of HIV, AIDS and AIDS-death Cases in Merauke Regency from 1992-January, 2017

	Reported cases		
Year	HIV infection	AIDS	AIDS-related death
1992-1999	114	71	80
2000	57	71	17
2001	31	56	13
2002	69	64	18
2003	20	54	11
2004	36	57	26
2005	57	46	32
2006	57	28	27
2007	68	13	18
2008	32	27	20
2009	67	29	18
2010	67	66	40
2011	54	80	35
2012	60	85	25
2013	65	48	45
2014	56	46	30
2015	70	29	40
2016	83	32	40
2017	0	0	2
Total	1063	902	537

Disease Control and Environmental Health of Merauke Regency, Merauke Health Office (MHO) 2017[7]

Statistical analysis: Statistical analysis was performed using SPSS 19 (IBM SPSS Inc., Chicago, IL)[8]. The independent variable was time (t) in years. Dependent variables were X1 = reported HIV infection cases, X2 = reported AIDS cases and X3 = reported AID-related death cases. Polynomial regression analysis was established using Microsoft Excel 2016 and it was used to determine the yearly trend in the HIV infection, AIDS and AIDS-related death cases ($p<0.05$).

RESULTS

The numbers of HIV infection, AIDS and AIDS-related death cases reported in Merauke Regency from 1992-January, 2017 are shown in Table 1. A total of 2,502 cases were reported for HIV infection, AIDS and AIDS-related death. The magnitude of the increase in reporting rates was 42.52 cases of HIV infection, 36.08 cases of AIDS and 21.48 cases of AIDS-related death per year for the 1992-2017 period.

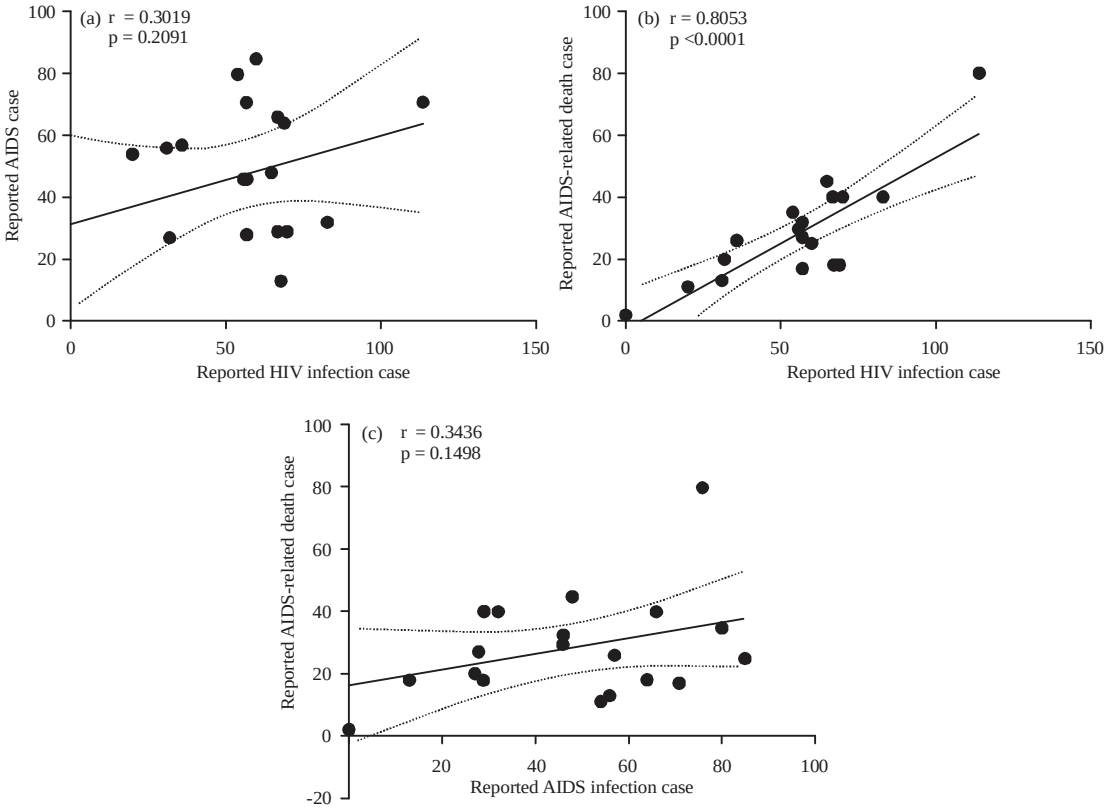

Fig. 1(a-c): Correlation between
(a) Reported HIV infection vs AIDS cases, (b) HIV infection vs AIDS-related death cases and (c) AIDS vs AIDS-related death cases

Table 2: Descriptive statistics of HIV, AIDS and AIDS-death reported

Descriptive statistics	Reported HIV cases	Reported AIDS cases	Reported AIDS-related death cases
Mean	55.95	47.47	28.26
Std. Deviation	24.70	23.05	16.97
Range	(0.00-114.00)	(0.00-85.00)	(2.00-80.00)
Variance	610.05	531.26	287.87

Descriptive statistics of predictor and response dependent variables of HIV infection, AIDS and AIDS-death cases reported in Merauke Regency from 1992-2017 are shown in Table 2. In this Table, the data demonstrated the descriptive statistic values for all the cases under study as well as their means, standard deviations, ranges and variants to explore the main features of data of Merauke Regency.

The relationship among the reported HIV infection, AIDS and AIDS-related death cases in Merauke Regency are demonstrated in Fig. 1. The direction, strength and significance of associations between the variables of HIV infection, AIDS and AIDS-related death cases were completed using the Pearson's correlation coefficients (r). The variable of reported HIV infection cases are significantly correlated with reported AIDS-related death cases ($p<0.0001$). There was no significant association between reported HIV infection and AIDS cases and reported AIDS and AIDS-related death case.

The prevalence of HIV infection, AIDS and AIDS-related death in Merauke by age, sex, ethnic and main occupation groups from 1992-2017 are presented in Fig. 2. The highest prevalence of HIV infection and AIDS was found of 25-49 years (59.54%) for age groups, women (51.15%) for sex groups, Papua (49.41%) for ethnic groups and labor/farmer/fisherman (21.22%) for main occupation groups.

The polynomial regression analysis of reported HIV infection, AIDS and AIDS-related death cases from 1992-January, 2017 in Merauke Regency is presented in Fig. 3. Polynomial regression analysis showed that the polynomials of degree 5 gave the well-fitted models for each population, resulting in 40.86% ($R^2 = 0.4086$) for reported HIV infection cases, 60.17% ($R^2 = 0.6017$) for reported AIDS cases and 58.90% ($R^2 = 0.5890$) for reported AIDS-related death cases. It

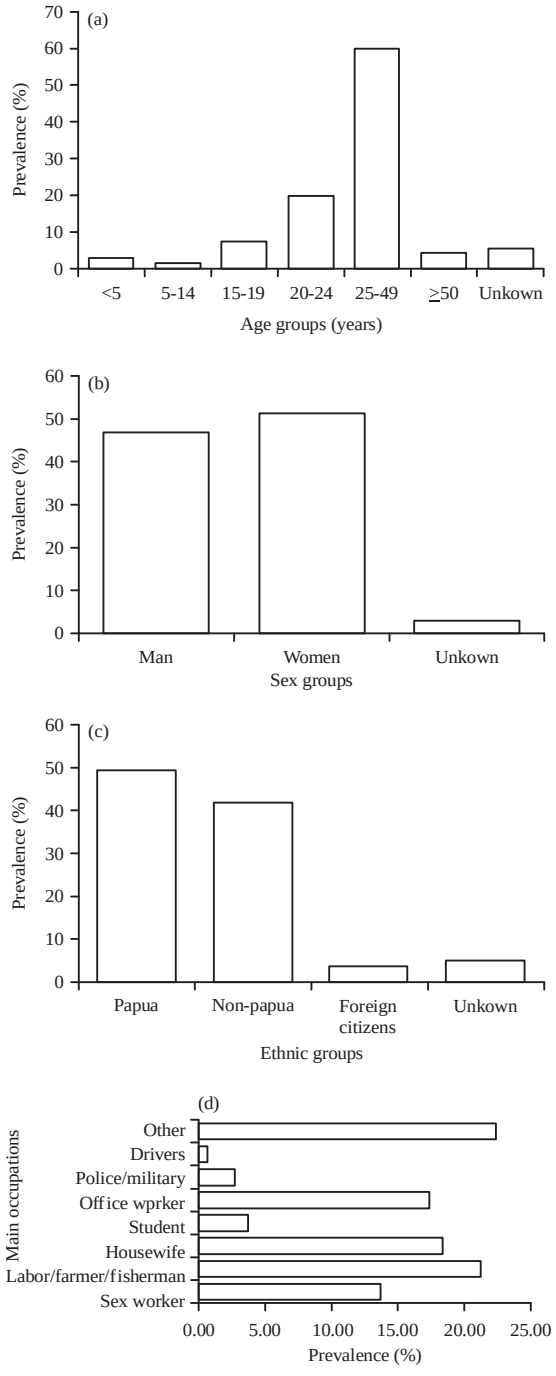

Fig. 2(a-d): (a) Trends of HIV/AIDS prevalence by age groups, (b) Sex groups, (c) Ethnic groups and (d) Main occupations in Merauke from 1992-2017

could explain the yearly variation when the 5th-degree polynomial model was applied as shown in Fig. 3. All the parameters of the fitted models were statistically significant ($p<0.05$).

DISCUSSION

The results of this study, identified some significant findings. Firstly, the number of HIV infection, AIDS and AIDS-related death cases reported in Merauke Regency from 1992-January, 2017 were 1,063, 902 and 537, respectively. Secondly, the gaps were steadily increasing in HIV infection and AIDS-related death case reported, while steadily reducing for AIDS case reported. The 1st HIV/AIDS case made its debut since in 1992 and the HIV/AIDS epidemic has become one of the most serious health and development challenge in Merauke Regency.

This is the 1st report, using local surveillance data to describe the epidemic of HIV infection and AIDS in Merauke Regency. The number of HIV infection, AIDS and AIDS-related death cases reported in Merauke Regency from 1992-January, 2017 are demonstrated in Table 1. HIV infection and AIDS remain global health and socioeconomic problems for individuals, families, communities and governments[9,10]. Merauke Regency in Papua Province has the highest prevalence of HIV infection and AIDS. An epidemiologic analysis is needed to understand how HIV infection and AIDS cases are currently handled and enable formulation of effective policies and programs to identify and eliminate risk factors that aid the spread of HIV and AIDS in Merauke Regency.

The data explained the significantly similar relationships between the reported HIV infection and AIDS-related death cases, however, there was no significant association between reported HIV infection and AIDS cases and reported AIDS and AIDS-related death cases (Fig. 2). In Malaysia, different report results indicated that the reported HIV infection, AIDS and AIDS-related death cases significantly ($p<0.05$) correlated with each other[11]. These findings need a resolution because HIV and AIDS can affect individuals in their productive years, their services significantly affect the development and growth of a country[12]. There are several global efforts to eliminate the effects of HIV infection and AIDS on population health including antiretroviral therapy[13,14], prevention of mother-to-child transmission[15], needle and syringe exchange programs[8], etc. However, in Merauke, appropriate use of information strategies to reduce the spread of HIV and AIDS infection is still limited.

WHO categorizes HIV/AIDS epidemic as low-level, concentrated and generalized, depending on HIV prevalence and the diffusion of HIV transmission in different sub-populations[16]. The results show that the epidemic remains concentrated (approximately 50% of reported cases) in individuals 25-49 years of age (59.54%), women (51.15%) and

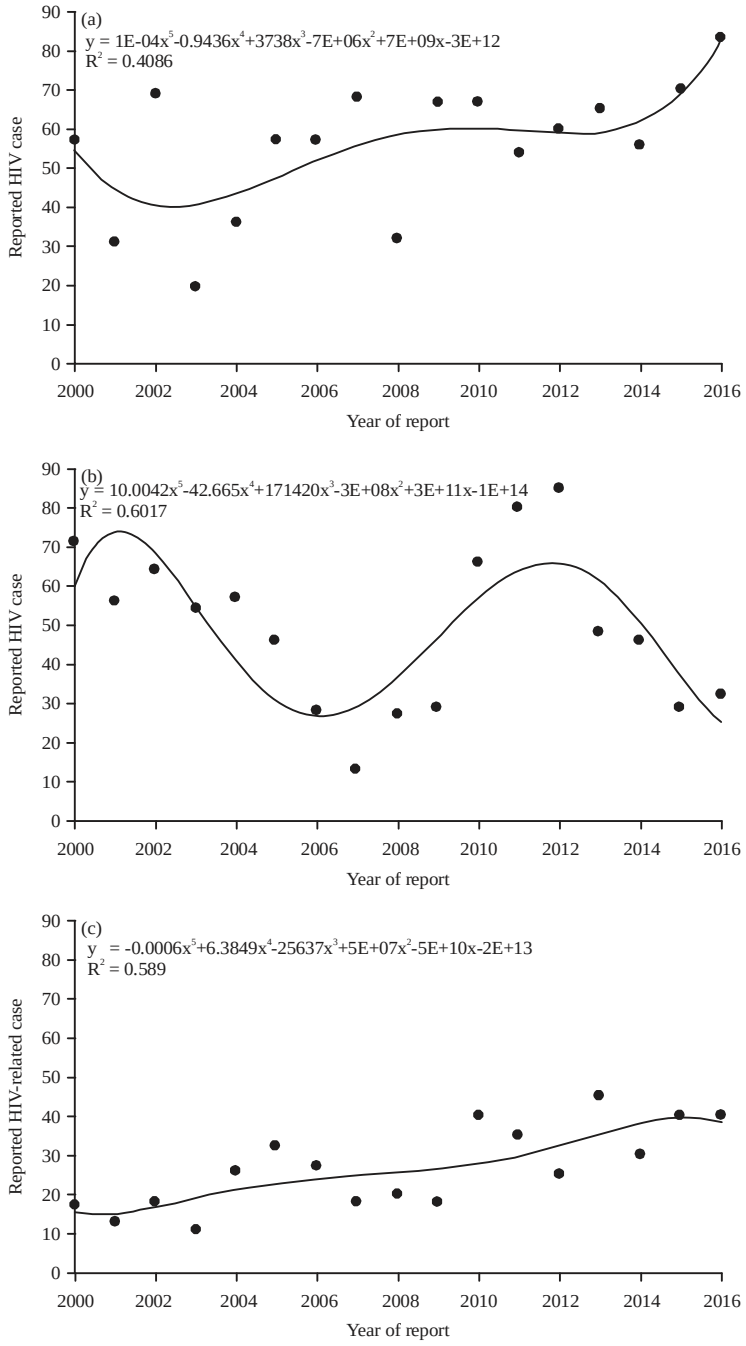

Fig. 3: Polynomial regression analysis of reported, (a) HIV infection, (b) AIDS and (c) AIDS-related death cases from 1992-January, 2017 in Merauke Regency

those of Papua ethnicity (49.41%). The HIV epidemic in some areas of Indonesia has already reached the "Concentrated" stage[17]. These data are limited information of critical populations. Several significant populations of nation in 2011 showed 41% HIV prevalence among people who inject drugs, 10% among direct female sex workers and 8% among men who have sex with men[18]. Thus, further epidemiologic analysis is needed to understand the population of individuals with HIV infection from Merauke Regency.

In data from 2000-2016, the highest reported HIV infection cases (83) occurred in 2016, reported AIDS cases (85) in 2012 and reported AIDS-related death cases (45) in 2013. The studies reviewed in the present work are limited because the models of the HIV/AIDS epidemic for demographic

parameters are mostly based on mathematical models. This study focused on descriptive statistics, correlation analysis and a polynomial regression model, it did not identify trends by age, sex and ethnic groups for relationships among annually reported cases of HIV infection, AIDS and AIDS-related deaths. Thus, future epidemiologic analysis should evaluate local context and changes in behaviors to develop targeted strategies to eliminate HIV infection and AIDS in Merauke Regency. Similarly, Hardon *et al.*[19] stated that achieving a global goal of reducing the incidence of HIV infection in children by 50%, requires the adjustment for globally designed public health programs for gender-based HIV transmission pathways, as well as, local opportunities for continued care and social support. Another study found a lack of comprehensive knowledge of HIV was associated with an increased risk of being diagnosed with HIV infection[20]. Stahlman *et al.*[21] concluded that there was a link between social stigma and testing positive for HIV. The absence of support for access to healthcare services plays a significant role in the prevention of HIV testing including the lack of transportation, lack of a phone, cost of the test, concerns about parental consent (for patients under 18 years old), the wait time for results and unfriendly test environments[22]. In a study in Nevada, Pharr *et al.*[22] found social barriers to HIV testing including behavioral risks such as lack of HIV infection awareness are important because they might result in a disproportionate number of new HIV infection cases. Wejnert *et al.*[23] reported that lack of knowledge has been recognized as a public health challenge that still needs to be addressed. Thus, in future, epidemiologic analysis in Merauke Regency, studies need to address additional factors associated with HIV infection including social norms, structural support and behavioral choices. In Papua Province, many coordinated programs and approaches have contributed to reduction in new HIV infection, including mass media campaigns, sexual health promotion and improvements and increased access to HIV and STI testing and treatment[24]. These programs can be alternatives to help prevent the spread of HIV infection in Merauke Regency.

CONCLUSIONS AND FUTURE RECOMMENDATIONS

We identified 1,063 HIV infection, 902 AIDS and 537 AIDS-related death cases in Merauke Regency from 1992-January, 2017. The Pearson correlation coefficient for the association between reported HIV infection and AIDS-related death cases was 0.8053 ($p<0.0001$). There were no correlations between reported HIV infection and AIDS cases and AIDS and AIDS-related death cases. The values of a variation curve of the 5th-degree polynomials were 40.86, 60.17 and 58.90% for reported HIV infection, AIDS and AIDS-related death cases, respectively.

Finally, further studies are needed in an epidemiologic analysis to address factors that could be associated with HIV infection in Merauke Regency including social norms, structural support and behavioral choices. The results could be useful for developing effective policies and program targets that address major risk factors and help to reduce the spread of HIV and AIDS.

SIGNIFICANCE STATEMENTS

This study discovered the trend spread and correlation of Human Immunodeficiency Virus (HIV) infection and Acquired Immune Deficiency Syndrome (AIDS) in Merauke Regency of Papua Province, Indonesia, from 1992-2017. This study will help the researcher to uncover the critical areas of HIV/AIDS epidemic in Merauke Regency that many researchers were not able to explore. Thus, a new theory on epidemiology analysis provides useful information for improving case prevention and management of HIV infection and AIDS in Merauke Regency of Papua Province, Indonesia.

ACKNOWLEDGMENT

This research was supported by the Ministry of Research Technology and Higher Education of the Republic of Indonesia. We thank to Disease Control and Environmental Health of Merauke Regency for supplying data in this study. We also thank to Waras Nurcholis from Department of Biochemistry, Bogor Agricultural University that significantly improved the manuscript.

REFERENCES

1. WHO., 2007. Review of the health sector response to HIV and AID in Indonesia. Ministry of the Health Republic of Indonesia, World Health Organization, Geneva, New Delhi, pp: 1-69.
2. Pendse, R., S. Gupta, D. Yu and S. Sarkar, 2016. HIV/AIDS in the South-East Asia region: Progress and challenges. J. Virus Eradicat., 2: 1-6.
3. Bakkali, T., K.C.W. Htin, E. Boonyatharokul, N. Wangchumtong, W.S. Cheng, Y.Y. Shwe and D. Rwodzi, 2010. HIV and AIDS data for Asia-pacific: Review in slides Indonesia maps. UNAIDS., UNICEF., World Health Organization and Asian Development Bank, Asia Pacific Research Statistical Data Information Resources AIDS Data Hub, Indonesia.

4. Wijayanti, F., S.N. Tarmizi, V. Tobing, T. Nisa, M. Akhtar, I. Trihandini and R. Djuwita, 2016. From the millennium development goals to sustainable development goals.: The response to the HIV epidemic in Indonesia. Challenges and opportunities. J. Virus Eradicat., 2: 27-31.
5. Depkes, 2014. Cases of HIV/AIDS in Indonesia reported through September 2014: Statistik Kasus HIV/AIDS di Indonesia Dilapor s/d September 2014. Departemen Kesehatan, Indonesian General Directorate of Communicable Disease Control and Environmental Health, Jakarta.
6. Depkes, 2016. Situasi penyakit HIV-AIDS di Indonesia. Departemen Kesehatan, InfoDATIN Pusat Data dan Informasi Kementerian Kesehatan RI., Jakarta, pp: 1-8.
7. MoHO., 2017. Info AIDS Kabupaten Merauke tahun 1992 s/d Januari 2017. Health of Merauke Health Office, Disease Control and Environmental, Merauke Regency, Jakarta, Indonesia.
8. Mondal, M.N.I. and M. Shitan, 2013. Factors affecting the HIV/AIDS epidemic: An ecological analysis of global data. Afr. Health Sci., 13: 301-310.
9. Yi, S., C. Ngin, S. Tuot, P. Chhoun and S. Chhim *et al*., 2017. HIV prevalence, risky behaviors and discrimination experiences among transgender women in Cambodia: Descriptive findings from a national integrated biological and behavioral survey. BMC Int. Health Hum. Rights, Vol. 17.
10. Hellinger, F.J., 2006. Economic models of antiretroviral therapy. Pharmacoeconomics, 24: 631-642.
11. Mondal, M.N.I. and M. Shitan, 2015. HIV/AIDS epidemic in Malaysia: Trend analysis from 1986-2011. S. Afr. J. Demogr., 16: 37-56.
12. UNAIDS., 2011. Global summary of the AIDS epidemic. Joint United Nations Program on HIV/AIDS (UNAIDS.), Geneva, Switzerland, pp: 1-8.
13. Ryom, L., J.D. Lundgren, S. De Wit, H. Kovari and P. Reiss *et al*., 2016. Use of antiretroviral therapy and risk of end-stage liver disease and hepatocellular carcinoma in HIV-positive persons. Aids, 30: 1731-1743.
14. I.S.S. Group, 2015. Initiation of antiretroviral therapy in early asymptomatic HIV infection. N. Engl. J. Med., 373: 795-807.
15. Townsend, C.L., L. Byrne, M. Cortina-Borja, C. Thorne and A. de Ruiter *et al*., 2014. Earlier initiation of ART and further decline in mother-to-child HIV transmission rates, 2000-2011. Aids, 28: 1049-1057.
16. Hall, H.I., L. Espinoza, N. Benbow, Y.W. Hu and Urban Areas HIV Surveillance Workgroup, 2010. Epidemiology of HIV infection in large urban areas in the United States. PloS One, Vol. 5. 10.1371/journal.pone.0012756.
17. Riono, P. and S. Jazant, 2004. The current situation of the HIV/AIDS epidemic in Indonesia. AIDS Edu. Prevent., 16: 78-90.
18. KEMENKES., 2011. Integrated biological and behavioral survey 2011. Directorate General CDC and EH Ministry of Health, Jakarta, Indonesia.
19. Hardon, A.P., P. Oosterhoff, J.D. Imelda, N.T. Anh and I. Hidayana, 2009. Preventing mother-to-child transmission of HIV in Vietnam and Indonesia: Diverging care dynamics. Soc. Sci. Med., 69: 838-845.
20. Yang, Z., Z. Huang, Z. Dong, J. Li, S. Zhang, N. Wu and M. Jin, 2016. Risk factors for HIV diagnosis among men who have sex with men: Results of a case-control study in one sample of Eastern China. AIDS Res. Hum. Retroviruses, 32: 1163-1168.
21. Stahlman, S., A. Grosso, S. Ketende, S. Sweitzer and T. Mothopeng *et al*., 2015. Depression and social stigma among MSM in Lesotho: Implications for HIV and sexually transmitted infection prevention. AIDS Behav., 19: 1460-1469.
22. Pharr, J.R., N.L. Lough and E.E. Ezeanolue, 2016. Barriers to HIV testing among young men who have sex with men (MSM): Experiences from Clark County, Nevada. Global J. Health Sci., 8: 9-17.
23. Wejnert, C., B. Le, C.E. Rose, A.M. Oster, A.J. Smith and J. Zhu, 2013. HIV infection and awareness among men who have sex with men-20 cities, United States, 2008 and 2011. PloS One, Vol. 8.
24. GRM Institute, Burnet Institute and Australian Government, 2014. Containing the HIV epidemic in Indonesia Papua through combination prevention. The HIV Cooperation Program for Indonesia (HCPI) with GRM Institute, Burnet Institute and Australian Government, Jakarta: pp: 1-2.